

CLAIMS

1. A pump controller for controlling a pump for a fluid medium such as water, said pump controller including:
 - 5 a metal substrate adapted to have a first side thereof exposed to said fluid medium;
 - an insulating medium applied to a second side of said substrate;
 - pressure sensing means including at least one pressure responsive element implemented on said insulating medium closely adjacent said substrate such that said pressure element is responsive to pressure of said fluid medium when said first side is exposed to said fluid medium;
 - 10 flow sensing means including at least one source of heat and at least one temperature responsive element implemented on said insulating medium closely adjacent said substrate, such that said temperature responsive element is responsive to flow of said fluid medium when said first side is exposed to said flow, said fluid medium providing a sink for said source of heat in a manner that is related to said flow;
 - 15 switching means for switching said pump on or off; and
 - processing means for receiving data from said pressure sensing means and said flow sensing means, said data being communicated via conductive tracks implemented on said insulating medium, said processing means being adapted for processing said data and for producing an output for driving said switching means.
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2. A pump controller according to claim 1 wherein said metal substrate includes titanium.
3. A pump controller according to claim 1 wherein said metal substrate includes low carbon stainless steel.
4. A pump controller according to claim 1, 2 or 3 wherein said insulating medium includes a ceramic.
- 10 5. A pump controller according to any one of the preceding claims wherein said pressure responsive element includes a plurality of resistors formed by conductive tracks on said insulating medium, said resistors being arranged such that pressure on said substrate is measured by a change in value due to tension on said resistors.
- 15 6. A pump controller according to any one of the preceding claims wherein said temperature responsive element includes an operational amplifier and a bridge circuit containing a plurality of thermisters.
- 20 7. A pump controller according to any one of the preceding claims wherein said switching means includes a triac.
8. A pump controller according to claim 7 wherein said triac is mounted on said substrate to provide said source of heat.

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9. A pump controller according to any one of the preceding claims wherein said at least one temperature responsive element includes a temperature sensor on each side of said metal substrate for detecting a temperature difference between said first and second sides.

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10. A pump controller according to claim 9 wherein said processing means is adapted to compensate for anomalies caused by said temperature difference.

11. A pump controller according to any one of the preceding claims wherein
10 said processing means includes a microprocessor or microcontroller.

12. A housing for a sensor substrate having a wet side and a dry side and adapted to promote contact of said wet side with a fluid medium and to substantially prevent contact of said dry side with said fluid medium, said
15 housing including:

a main body having an opening for said fluid medium and for receiving said sensor substrate with its wet side exposed to said opening;

a first chamber maintained substantially at atmospheric pressure;

first sealing means arranged between said opening and said sensor
20 substrate such that a leak path is provided to said first chamber;

a closure for said housing including a second chamber exposed to said dry side of said sensor substrate; and

second sealing means arranged between said closure and said first chamber to substantially prevent ingress of said fluid medium to said second
25 chamber.

13. A housing according to claim 12 wherein said first sealing means includes a peripheral bead interposed between said wet side of said sensor substrate and an inner edge of said opening.

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14. A housing according to claim 12 or 13 wherein said second sealing means includes a peripheral bead interposed between an edge associated with said first chamber and said closure.

10 15. A housing according to any one of claims 12 to 14 wherein said first and second sealing means are connected by a membrane, said membrane providing an additional barrier to moisture reaching said dry side of said sensor substrate.

15 16. A housing according to claim 15 wherein said membrane includes a recess for receiving a peripheral edge of said sensor substrate.

17. A housing according to any one of claims 12 to 16 wherein said first and second sealing means are formed from an elastomeric material.

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18. A housing according to any one of claims 12 to 17 wherein said membrane is formed from an elastomeric material.

25 19. A housing according to any one of claims 12 to 18 including a venturi device adapted to accelerate flow of pumped fluid in the vicinity of said opening.

20. A pump controller adapted for controlling a pump for a fluid medium substantially as herein described with reference to Figures 1 to 3 of the accompanying drawings.

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21. A housing for a sensor substrate substantially as herein described with reference to Figures 4 to 12 of the accompanying drawings.